Modeling & Simulation:

Initiative to Incorporate Modeling and Simulation into the Acquisition Process and System Engineering Model

"Deep Dives"

State of Practice Study

11 December 2007

Ted Polit
M&S Project Manager

Elements of the Study

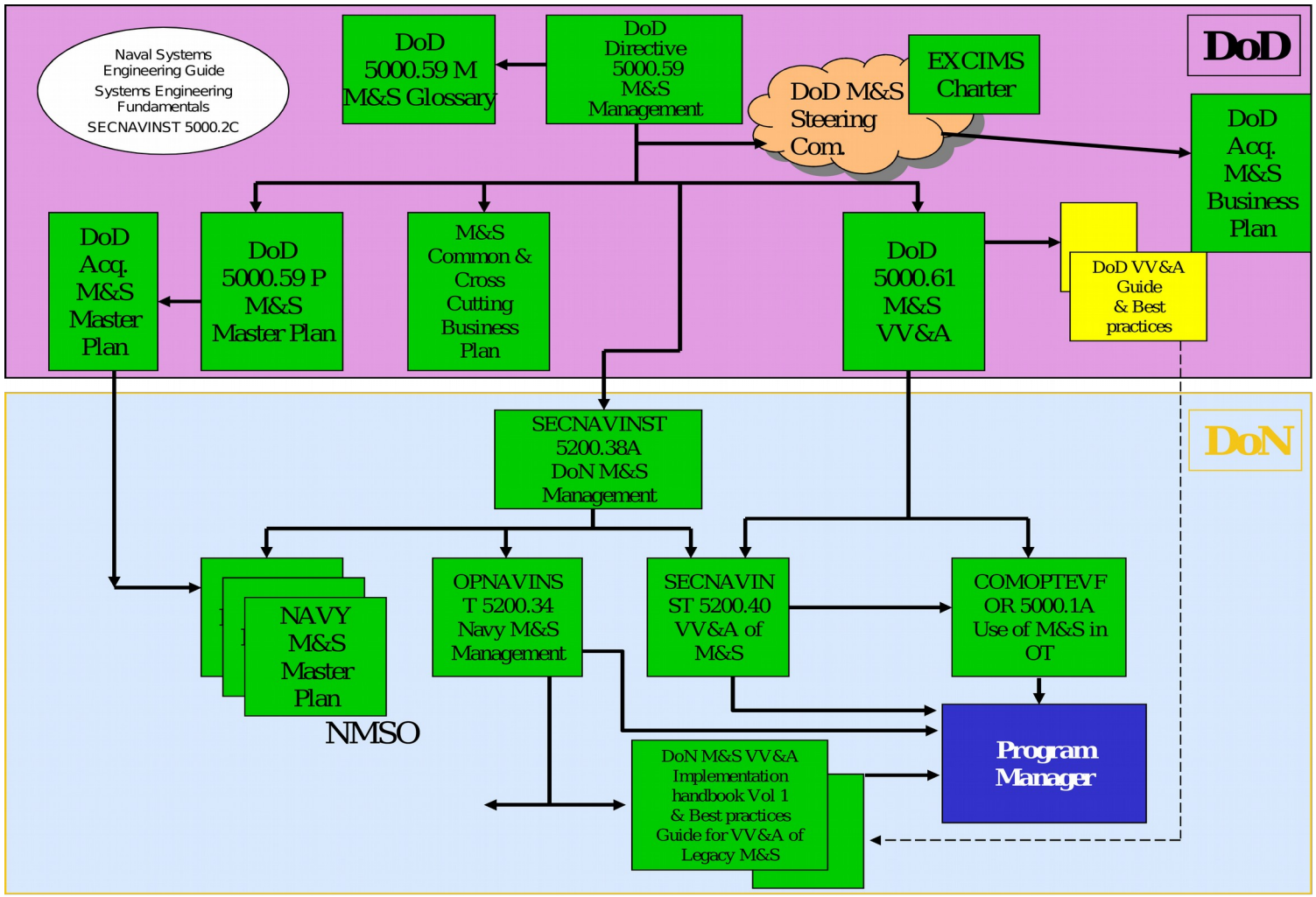
- Identify Requirements/Guideline Documents
- Establish Baseline Acquisition/Sys Eng Model
- Develop Taxonomy Schema for Categorizing M&S
- Perform State of Practice Interviews
- Compile Interview results
- Prototype M&S implementation/integration approach
- Test approach with live program implementation
- Recommend Changes to DoD documents
- Recommend Training Approach

Requirements/Guideline Documents

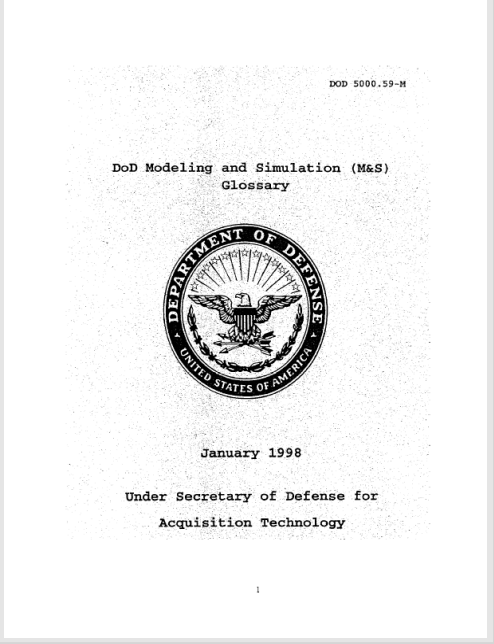
Doc Type	Qty
Policy/ Guidance	15
Instruction/ directive	9
Standards/ Plans	21
Manual/ Guide	17
Report/ Survey/ Study	12
Article/ Analysis/ Paper	14
Total documents	**88**

- Reviewed and categorized 88 Documents
- 20 documents form basis for DoD/DoN direction and guidelines
- Program should be familiar with the reg’ts in these

M&S Directives/Instructions


DoD
Naval Systems Engineering Guide
Systems Engineering Fundamentals
SECNAVINST 5000.2C
DoD 5000.59 M M&S Glossary
DoD Directive 5000.59 M&S Management
DoD M&S Steering Com.
EXCIMS Charter
DoD Acq. M&S Business Plan
DoD Acq. M&S Master Plan
DoD 5000.59 P M&S Master Plan
M&S Common & Cross Cutting Business Plan
DoD 5000.61 M&S VV&A
DoD VV&A Guide & Best practices
DoN
SECNAVINST 5200.38A DoN M&S Management
NAVY M&S Master Plan
NMSO
OPNAVINST 5200.34 Navy M&S Management
SECNAVINST 5200.40 VV&A of M&S
COMOPTEVFOR 5000.1A Use of M&S in OT
Program Manager
DoN M&S VV&A Implementation handbook Vol 1 & Best practices Guide for VV&A of Legacy M&S

DoD Directive 5000.59 dtd 8/8/07
DoD Modeling and Simulation (M&S) Management


DOD 5000.59-M

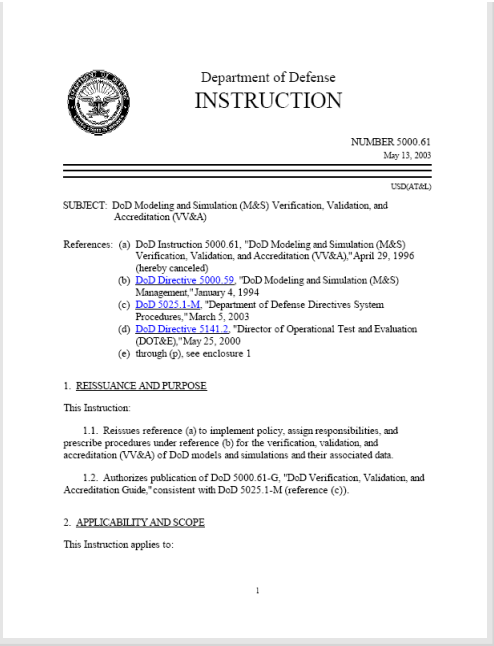
DoD Modeling and Simulation (M&S)
Glossary

January 1998

Under Secretary of Defense for
Acquisition Technology

- Establishes the DoD M&S Steering Committee
- Authorizes 5000.59M
- Applies to all DoD M&S
- Sets up DoD M&S coordination agents
- Delineates responsibilities for:
  - USD, ATL
  - CJCS
  - USD(P&R)
  - DPA&E
  - DOT&E
  - Commander US Joint Forces Command
  - Heads of DoD Components
    - Implement management process that provides visibility to M&S
    - Develop, manage, provide info on, and support development of M&S
    - Maximize reuse, interoperability, commonality, efficiency and effectiveness of M&S
    - Appoint a rep to the M&S SC
    - Coordinate all aspects of DoD M&S management in your M&S area once assigned as a MSCA

DoD Instruction 5000.61 dtd 5/13/03
DoD Modeling and Simulation (M&S) VV&A



Department of Defense
INSTRUCTION

NUMBER 5000.61
May 13, 2003

USD(AT&L)

SUBJECT: DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A)

References: (a) DoD Instruction 5000.61, "DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A)," April 29, 1996 (hereby canceled)
(b) DoD Directive 5000.59, "DoD Modeling and Simulation (M&S) Management," January 4, 1994
(c) DoD 5025.1-M, "Department of Defense Directives System Procedures," March 5, 2003
(d) DoD Directive 5141.2, "Director of Operational Test and Evaluation (DOT&E)," May 25, 2000
(e) through (p), see enclosure 1

1. REISSUANCE AND PURPOSE

This Instruction:

1.1. Reissues reference (a) to implement policy, assign responsibilities, and prescribe procedures under reference (b) for the verification, validation, and accreditation (VV&A) of DoD models and simulations and their associated data.

1.2. Authorizes publication of DoD 5000.61-G, "DoD Verification, Validation, and Accreditation Guide," consistent with DoD 5025.1-M (reference (c)).

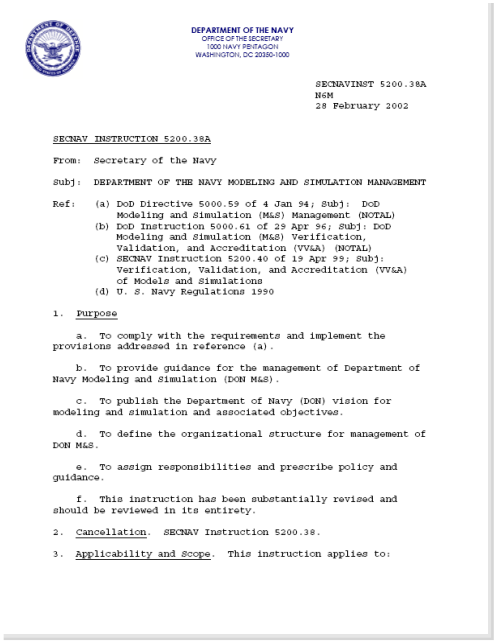
2. APPLICABILITY AND SCOPE

This Instruction applies to:

1

- Implements policy, assigns responsibilities, and prescribes procedures for DoD VV&A
- Authorizes publication of 5000.61 G “DoD VV&A Guide”
- M&S used to support major decision making must be accredited for that specific purpose by the Component M&S Application Sponsor
- DoD components must establish VV&A policies and procedures for their M&S
- Follow all section 6 procedures
- Directs the appointment and duties of lower level process marshals
- VV&A activities required for all M&S and must be documented

SECNAVINST 5200.38A dtd 2/28/02
DoN Modeling and Simulation Management



DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
1000 NAVY PENTAGON
WASHINGTON, DC 20350-1000

SECNAVINST 5200.38A
N6N
28 February 2002

SECNAV INSTRUCTION 5200.38A

From: Secretary of the Navy

Subj: DEPARTMENT OF THE NAVY MODELING AND SIMULATION MANAGEMENT

Ref: (a) DoD Directive 5000.59 of 4 Jan 94; Subj: DoD Modeling and Simulation (M&S) Management (NOTAL)
(b) DoD Instruction 5000.61 of 29 Apr 96; Subj: DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A) (NOTAL)
(c) SECNAV Instruction 5200.40 of 19 Apr 99; Subj: Verification, Validation, and Accreditation (VV&A) of Models and Simulations
(d) U. S. Navy Regulations 1990

1. Purpose

a. To comply with the requirements and implement the provisions addressed in reference (a).

b. To provide guidance for the management of Department of Navy Modeling and Simulation (DON M&S).

c. To publish the Department of Navy (DON) vision for modeling and simulation and associated objectives.

d. To define the organizational structure for management of DON M&S.

e. To assign responsibilities and prescribe policy and guidance.

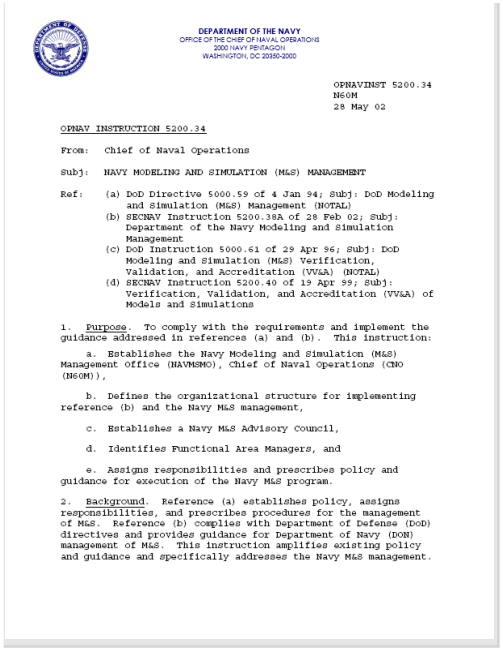
f. This instruction has been substantially revised and should be reviewed in its entirety.

2. Cancellation. SECNAV Instruction 5200.38.

3. Applicability and Scope. This instruction applies to:

- Defines org structure for DoN M&S management
- Directs the Navy and USMC to establish indigenous M&S efforts and to coordinate them
- Navy shall administer the DoN M&S Resource catalog
- VV&A all M&S and input data per 5000.61 and 5200.40
- CNO & CMC will select the MSEAs
- Establish service M&S management offices that
  - Coordinate M&S issues within the service (DoN/USMC)
  - Provide reps to working groups and steering committees
- The M&S practitioner should:
  - Annually update M&S catalog
  - Follow all associated policies herein

OPNAVINST 5200.34 dtd 5/28/02
Navy Modeling and Simulation (M&S) Management



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, DC 20350-2000

OPNAVINST 5200.34
N60M
28 May 02

OPNAV INSTRUCTION 5200.34

From: Chief of Naval Operations

Subj: NAVY MODELING AND SIMULATION (M&S) MANAGEMENT

Ref: (a) DoD Directive 5000.59 of 4 Jan 94; Subj: DoD Modeling and Simulation (M&S) Management (NOTAL)
(b) SECNAV Instruction 5200.38A of 28 Feb 02; Subj: Department of the Navy Modeling and Simulation Management
(c) DoD Instruction 5000.61 of 29 Apr 96; Subj: DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A) (NOTAL)
(d) SECNAV Instruction 5200.40 of 19 Apr 99; Subj: Verification, Validation, and Accreditation (VV&A) of Models and Simulations

1. Purpose. To comply with the requirements and implement the guidance addressed in references (a) and (b). This instruction:

a. Establishes the Navy Modeling and Simulation (M&S) Management Office (NAVMSMO), Chief of Naval Operations (CNO (N60M)),

b. Defines the organizational structure for implementing reference (b) and the Navy M&S management,

c. Establishes a Navy M&S Advisory Council,

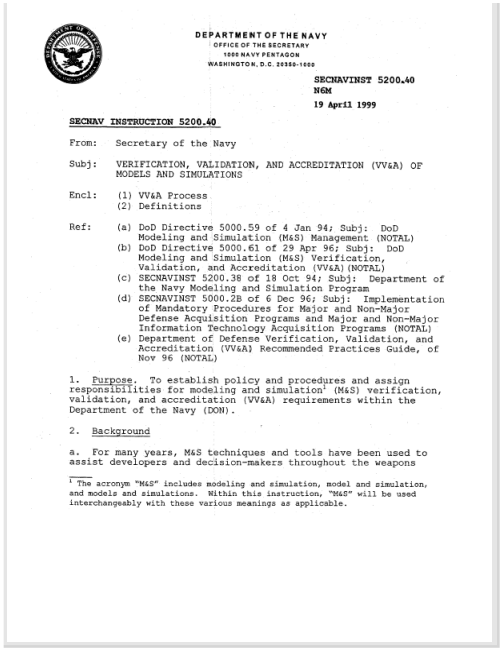
d. Identifies Functional Area Managers, and

e. Assigns responsibilities and prescribes policy and guidance for execution of the Navy M&S program.

2. Background. Reference (a) establishes policy, assigns responsibilities, and prescribes procedures for the management of M&S. Reference (b) complies with Department of Defense (DoD) directives and provides guidance for Department of Navy (DON) management of M&S. This instruction amplifies existing policy and guidance and specifically addresses the Navy M&S management.

- Establishes NMSO as the Navy focal point for all M&S matters
- Defines Navy M&S management organizational structure
- Establishes a Navy M&S Advisory Council and functional area managers
- NMSO is responsible for coordination and integration of M&S across all warfare and support areas
- Designates DCNO Warfare, Requirements, and Programs as the Navy MSEA
- Stipulates makeup of the advisory council and delineates its responsibility to advise CNO on M&S matters
- Establishes functional area managers for M&S who marshal M&S in their functional area
- NMSO will:
  - Establish and maintain centralized information distribution system to include M&S catalog and technical assistance
  - Serve as liaison to other services on M&S
  - Establish and chair the Navy M&S working group

SECNAVINST 5200.40 dtd 4/19/99
VV&A of Models and Simulations



DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
1000 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

SECNAVINST 5200.40
N6M
19 April 1999

SECNAV INSTRUCTION 5200.40

From: Secretary of the Navy

Subj: VERIFICATION, VALIDATION, AND ACCREDITATION (VV&A) OF MODELS AND SIMULATIONS

Encl: (1) VV&A Process
(2) Definitions

Ref: (a) DoD Directive 5000.59 of 4 Jan 94; Subj: DoD Modeling and Simulation (M&S) Management (NOTAL)
(b) DoD Directive 5000.61 of 29 Apr 96; Subj: DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A) (NOTAL)
(c) SECNAVINST 5200.38 of 18 Oct 94; Subj: Department of the Navy Modeling and Simulation Program
(d) SECNAVINST 5000.2B of 6 Dec 96; Subj: Implementation of Mandatory Procedures for Major and Non-Major Defense Acquisition Programs and Major and Non-Major Information Technology Acquisition Programs (NOTAL)
(e) Department of Defense Verification, Validation, and Accreditation (VV&A) Recommended Practices Guide, of Nov 96 (NOTAL)

1. Purpose. To establish policy and procedures and assign responsibilities for modeling and simulation[1] (M&S) verification, validation, and accreditation (VV&A) requirements within the Department of the Navy (DON).

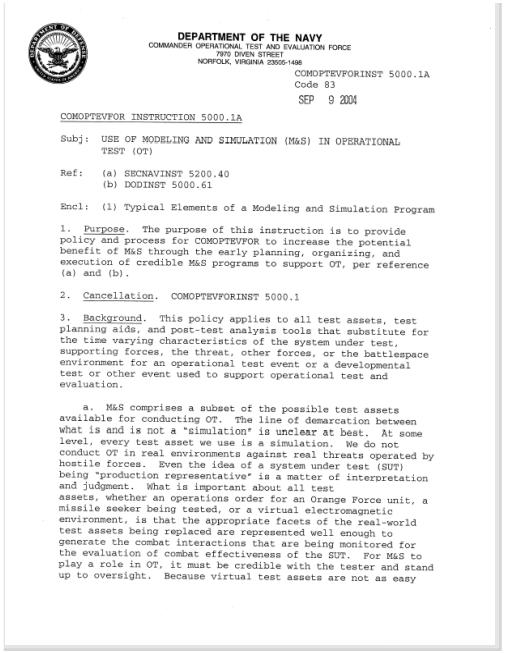
2. Background

a. For many years, M&S techniques and tools have been used to assist developers and decision-makers throughout the weapons

[1] The acronym "M&S" includes modeling and simulation, model and simulation, and models and simulations. Within this instruction, "M&S" will be used interchangeably with these various meanings as applicable.

- Applies to all M&S complied after date of instruction or who meet certain financial or criticality criteria
- Establishes the DoN VV&A process
- Requires all applicable M&S to V&Ved and accredited by the appropriate authority prior to its use
- M&S must be labeled as Non-accredited until such time it is
- Accreditation authority may tailor the VV&A process
- COMOPTEVFOR and MCOTEA are responsible for accreditation of OT M&S
- DoNMSMO shall
  - Develop training for accreditors
  - Ensure archiving of VV&A activities
  - Annually assess VV&A implementation
- DoN M&S TSG shall
  - Develop and issue DoN VV&A Implementation handbook
  - Coordinate DoN VV&A implementation with DoD
  - Technical advisor and M&S repository manager for VV&A activities plans and reports
- M&S Proponent shall
  - Develop and implement V&V plan and insure accreditor acts prior to use
  - Fwd plan and accreditation and repots to Dmsmo for the repository
  - Prepare a V&V report
- USD(A&T) assigns responsibility for certain common and general use M&S to MSCAs (MSEAs)
- MSEAs establish appropriate VV&A procedures for their M&S
- Includes description of the VV&A process and its integration with the M&S develop process

COMOPTEVFOR 5000.1A dtd 9/9/04
Use of Modeling and Simulation (M&S) in Operational Test (OT)



DEPARTMENT OF THE NAVY
COMMANDER OPERATIONAL TEST AND EVALUATION FORCE
7970 DIVEN STREET
NORFOLK, VIRGINIA 23505-1498

COMOPTEVFORINST 5000.1A
Code 83
SEP 9 2004

COMOPTEVFOR INSTRUCTION 5000.1A

Subj: USE OF MODELING AND SIMULATION (M&S) IN OPERATIONAL TEST (OT)

Ref: (a) SECNAVINST 5200.40
(b) DODINST 5000.61

Encl: (1) Typical Elements of a Modeling and Simulation Program

1. Purpose. The purpose of this instruction is to provide policy and process for COMOPTEVFOR to increase the potential benefit of M&S through the early planning, organizing, and execution of credible M&S programs to support OT, per reference (a) and (b).

2. Cancellation. COMOPTEVFORINST 5000.1

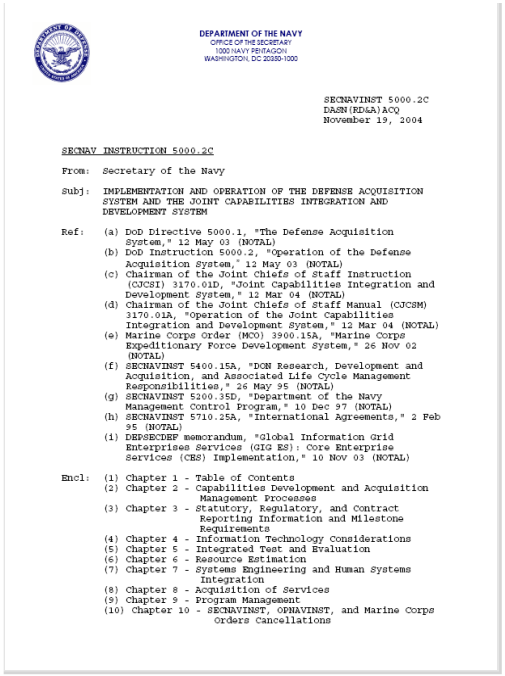
3. Background. This policy applies to all test assets, test planning aids, and post-test analysis tools that substitute for the time varying characteristics of the system under test, supporting forces, the threat, other forces, or the battlespace environment for an operational test event or a developmental test or other event used to support operational test and evaluation.

a. M&S comprises a subset of the possible test assets available for conducting OT. The line of demarcation between what is and is not a "simulation" is unclear at best. At some level, every test asset we use is a simulation. We do not conduct OT in real environments against real threats operated by hostile forces. Even the idea of a system under test (SUT) being "production representative" is a matter of interpretation and judgment. What is important about all test assets, whether an operations order for an Orange Force unit, a missile seeker being tested, or a virtual electromagnetic environment, is that the appropriate facets of the real-world test assets being replaced are represented well enough to generate the combat interactions that are being monitored for the evaluation of combat effectiveness of the SUT. For M&S to play a role in OT, it must be credible with the tester and stand up to oversight. Because virtual test assets are not as easy

- Supports early development of use cases and accreditation criteria
- Addresses all M&S to be used in OT or in DT that supports OT
- COMOPTEVFOR accredits use of M&S and resolves critical issues for OT
- ACOS (W) provide impact assessment to COMOPTEVFOR of using M&S to resolve COI in OT
- OTC
  - assess risk of insufficient program M&S resources
  - Submit M&S lessons learned after each M&S OT use
- MSM
  - provides direct support to the ACOS(W), OTC, and OTD
  - Reviews data requested from PM for rigor and relevance
  - Maintains core knowledge on m&S use in OT and its documentation
- Accreditation approval required 120 days from start of OT phase
- OPTEVFOR does not lead the acceptability requirements
  - Establish accreditation M&S effort but
  - Generate OT criteria for the PM to meet
  - Each criterion should have both threshold values and acceptable deviations from threshold values
- Use of M&S in OT must b called out in TEMP and TES and test plans
- PMs must supply sufficient V&V data to support accreditation in time
  - PMs encouraged to submit V&V data piece meal
- OTD
  - must create a capability model (defined in the instruction) for points where M&S is to be used in OT
  - Submit M&S lessons learned after each M&S OT use
- Instruction also provides typical elements and construct of an M&S program

SECNAVINST 5000.2C dtd 11/19/04

Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System



DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
1000 NAVY PENTAGON
WASHINGTON, DC 20350-1000

SECNAVINST 5000.2C
DASN(RDA)ACQ
November 19, 2004

SECNAV INSTRUCTION 5000.2C

From: Secretary of the Navy

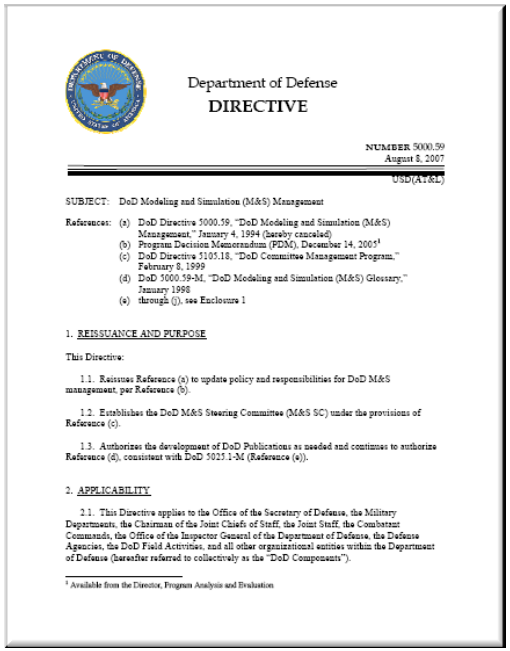
Subj: IMPLEMENTATION AND OPERATION OF THE DEFENSE ACQUISITION SYSTEM AND THE JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM

Ref: (a) DoD Directive 5000.1, "The Defense Acquisition System," 12 May 03 (NOTAL)
(b) DoD Instruction 5000.2, "Operation of the Defense Acquisition System," 12 May 03 (NOTAL)
(c) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01D, "Joint Capabilities Integration and Development System," 12 Mar 04 (NOTAL)
(d) Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3170.01A, "Operation of the Joint Capabilities Integration and Development System," 12 Mar 04 (NOTAL)
(e) Marine Corps Order (MCO) 3900.15A, "Marine Corps Expeditionary Force Development System," 26 NOV 02 (NOTAL)
(f) SECNAVINST 5400.15A, "DON Research, Development and Acquisition, and Associated Life Cycle Management Responsibilities," 26 May 95 (NOTAL)
(g) SECNAVINST 5200.35D, "Department of the Navy Management Control Program," 10 Dec 97 (NOTAL)
(h) SECNAVINST 5710.25A, "International Agreements," 2 Feb 95 (NOTAL)
(i) DEPSECDEF memorandum, "Global Information Grid Enterprises Services (GIG ES): Core Enterprise Services (CES) Implementation," 10 Nov 03 (NOTAL)

Encl: (1) Chapter 1 - Table of Contents
(2) Chapter 2 - Capabilities Development and Acquisition Management Processes
(3) Chapter 3 - Statutory, Regulatory, and Contract Reporting Information and Milestone Requirements
(4) Chapter 4 - Information Technology Considerations
(5) Chapter 5 - Integrated Test and Evaluation
(6) Chapter 6 - Resource Estimation
(7) Chapter 7 - Systems Engineering and Human Systems Integration
(8) Chapter 8 - Acquisition of Services
(9) Chapter 9 - Program Management
(10) Chapter 10 - SECNAVINST, OPNAVINST, and Marine Corps Orders Cancellations

- Assigns VV&A responsibilities to the PM for every program for DT, and V&V responsibilities for OT M&S.
- Assigns Accreditation responsibilities to the OTA for every program for OT M&S.
- States Accreditation must be re done for each OT program by the OTA
- States “M&S shall not replace the need for OT&E and will not be the primary evaluation methodology.”
- Use of M&S must be delineated in the TEMP for each OT and DT phase it is to be used

DoD Directive 5000.59, Aug 2007



Department of Defense
DIRECTIVE

NUMBER 5000.59
August 8, 2007
USD(AT&L)

SUBJECT: DoD Modeling and Simulation (M&S) Management

References: (a) DoD Directive 5000.59, "DoD Modeling and Simulation (M&S) Management," January 4, 1994 (hereby canceled)
(b) Program Decision Memorandum (PDM), December 14, 2005[1]
(c) DoD Directive 5105.18, "DoD Committee Management Program," February 8, 1999
(d) DoD 5000.59-M, "DoD Modeling and Simulation (M&S) Glossary," January 1998
(e) through (j), see Enclosure 1

1. REISSUANCE AND PURPOSE

This Directive:

1.1. Reissues Reference (a) to update policy and responsibilities for DoD M&S management, per Reference (b).

1.2. Establishes the DoD M&S Steering Committee (M&S SC) under the provisions of Reference (c).

1.3. Authorizes the development of DoD Publications as needed and continues to authorize Reference (d), consistent with DoD 5025.1-M (Reference (e)).

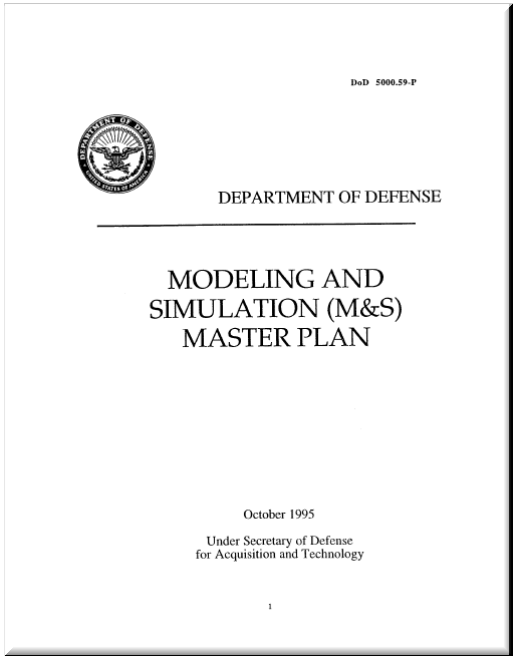
2. APPLICABILITY

2.1. This Directive applies to the Office of the Secretary of Defense, the Military Departments, the Chairman of the Joint Chiefs of Staff, the Joint Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components").

[1] Available from the Director, Program Analysis and Evaluation

- **DoD Modeling and Simulation Management**
- **Key points:**
  - Establishes a management and administrative structure for M&S management to develop plans, programs, procedures, issuances, and pursue common and cross-cutting M&S tools, data, and services
  - Provides oversight for development of a vision for DoD M&S
  - Establishes DoD M&S Steering Committee (M&S SC)
  - Develop, submit for USD(AT&L) approval, and implement the M&S Common and Cross-Cutting business plan
  - Delineates responsibilities for the administration and management of M&S activities across DoD components

DoD Pamphlet 5000.59-P, Oct 1995


DoD 5000.59-P

DEPARTMENT OF DEFENSE

MODELING AND SIMULATION (M&S) MASTER PLAN

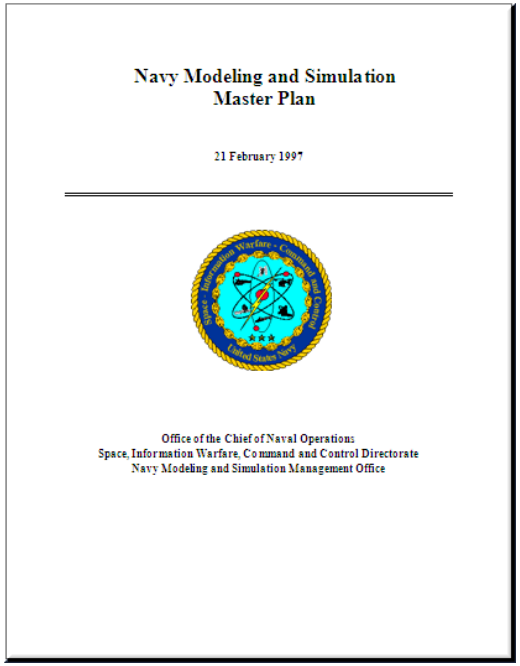
October 1995

Under Secretary of Defense for Acquisition and Technology

1

- **DoD Modeling and Simulation Master Plan**
- **Key points:**
  - Implements policy outlined in DoD 5000.59
  - Establishes a vision for DoD Modeling and Simulation (M&S) and a process for defining future M&S-based capabilities
  - Provides guidelines for development, cooperation, and coordination of M&S efforts
  - Establishes DoD M&S Objectives, identifies actions, and, where possible, assigns responsibilities for accomplishing them
  - Provides justification for resource allocations to M&S within DoD Component programming and budgeting processes

Navy Modeling and Simulation Master Plan

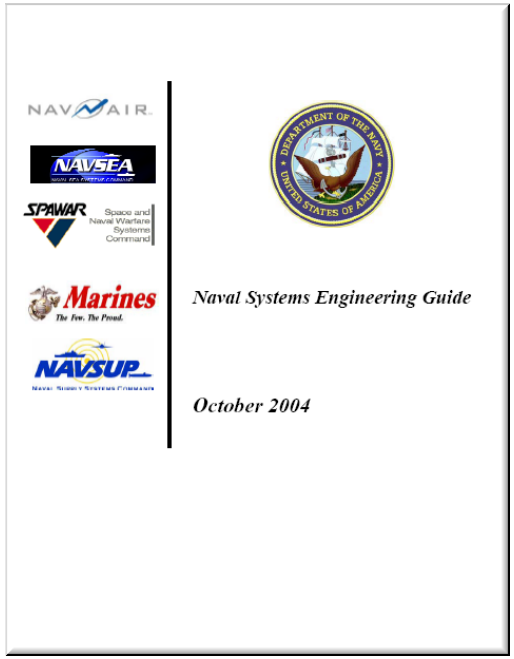

Navy Modeling and Simulation
Master Plan

21 February 1997

Office of the Chief of Naval Operations
Space, Information Warfare, Command and Control Directorate
Navy Modeling and Simulation Management Office

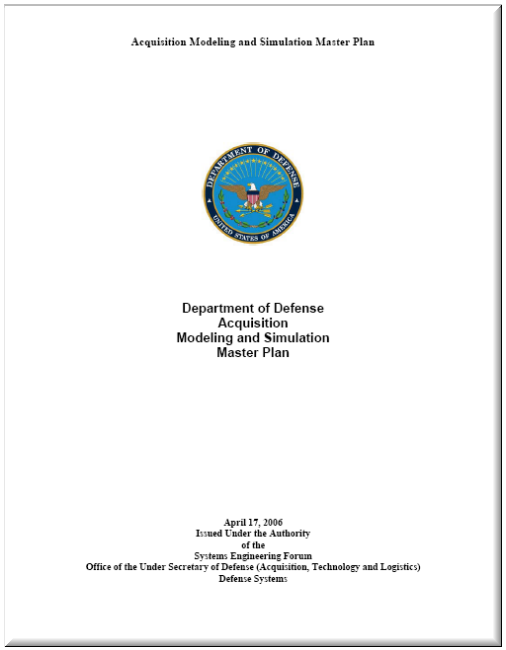
- **Navy Modeling and Simulation Master Plan, 21 February 1997**
- **Key points:**
  - Provides the Navy's Modeling and Simulation (M&S) vision, organization, strategy, and general guidance for the development and management oversight of the Navy's M&S resources.
  - Focuses the Navy M&S strategy into the areas of Training, Assessment, and Acquisition
  - Promotes coordination and integration of modeling and simulation efforts within the Navy and across the seven M&S functional areas defined in SECNAVINST 5200.38: Training, Training Systems and Education; Support to Operations; Acquisition, Research and Development; Assessment; Logistics; Doctrine; and Test and Evaluation.

Naval Systems Engineering Guide



- **Naval Systems Engineering Guide, October 2004**
- **Key points:**
  - Guide defines system engineering (SE) requirements and tasks, implementation & products, and explains tools & techniques
  - Satisfies DoD requirement for a documented SE process
  - Guide follows ANSI/EIA 632 standard, *Processes for Engineering a System*
  - Outlines 33 sub-processes for engineering a system
  - Approach established by Naval Systems Engineering Steering Group (SESG) with membership from NAVAIR, NAVSEA, MARCOR, and SPAWAR

DoD Acquisition M&S MP, Apr 2006


Acquisition Modeling and Simulation Master Plan

Department of Defense
Acquisition
Modeling and Simulation
Master Plan

April 17, 2006
Issued Under the Authority
of the
Systems Engineering Forum
Office of the Under Secretary of Defense (Acquisition, Technology and Logistics)
Defense Systems

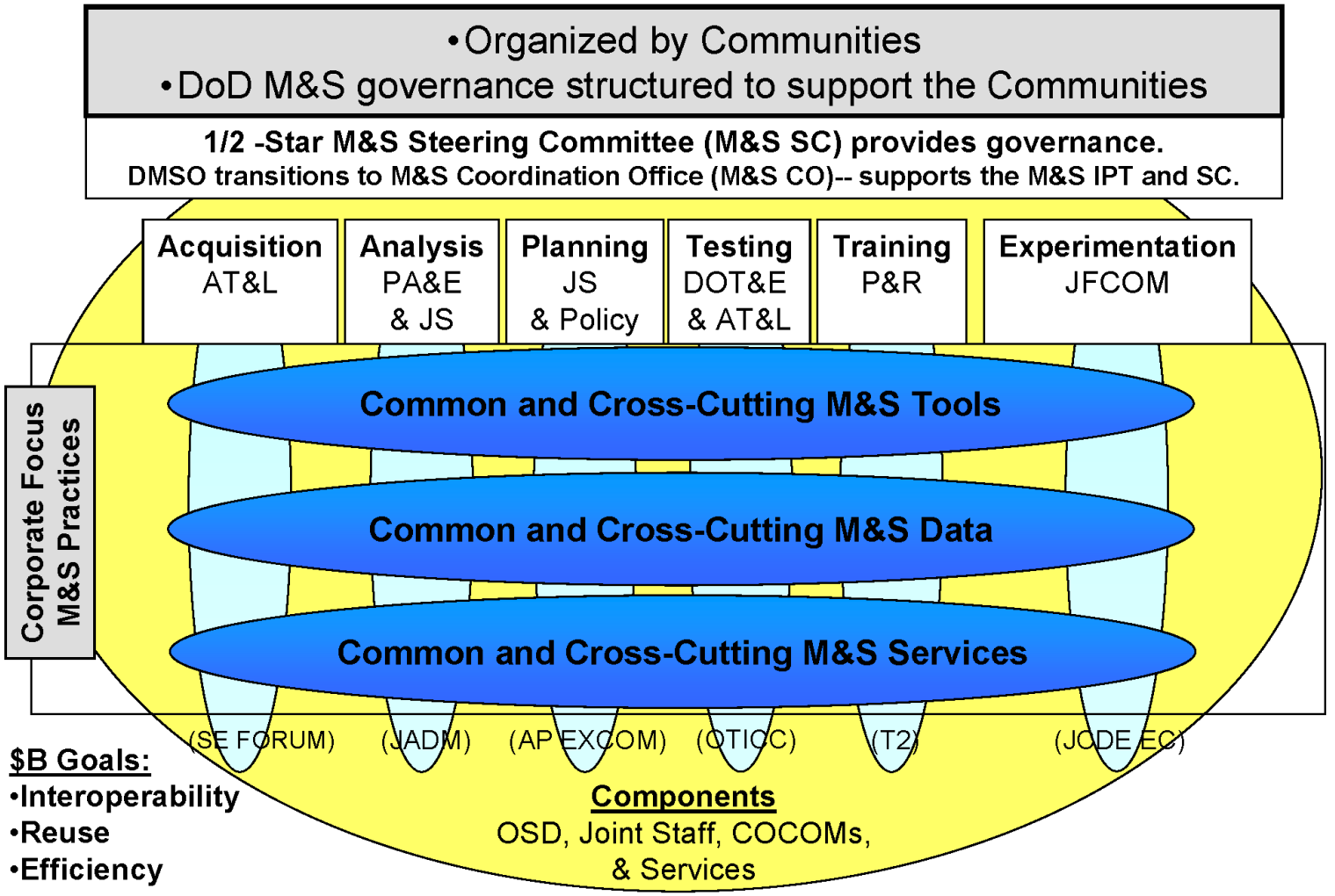
- **DoD Acquisition Modeling and Simulation Master Plan, 17 Apr 2006**
- **Key points:**
  - Acquisition M&S Working Group provided a plan to improve M&S support to DoD acquisition for defining, developing, testing, producing & sustaining capabilities
  - Defines 27 specific actions to:
    - Foster M&S capabilities beyond individual programs
    - Better enable acquisition of joint capabilities and system of systems
    - Empower PM's by removing systemic M&S obstacles, identifying new options & supporting widely-shared needs
    - Promote coordination and interface with M&S activities of DoD components
  - Identifies organizational responsibilities, products and completion goals

Acquisition M&S Objectives & Actions

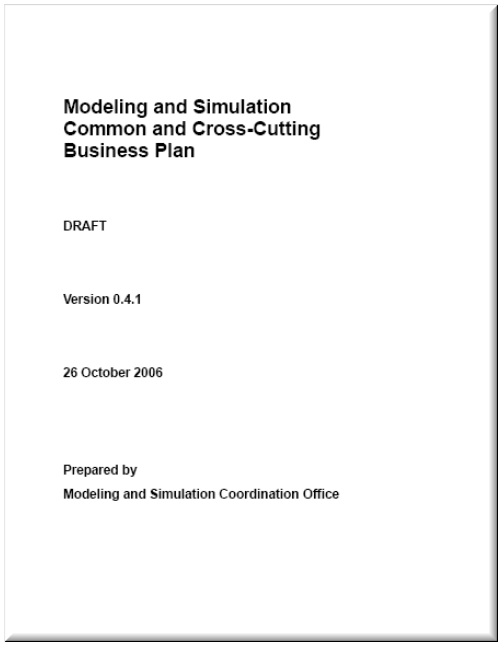
Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Provide necessary policy & guidance	**Enhance technical framework for M&S**	**Improve M&S capabilities**	**Improve M&S use**	**Shape the workforce**
Actions	***Actions***	***Actions***	***Actions***	***Actions***
1-1 M&S management	2-1 Product development metamodel	3-1 Acquisition inputs to DoD M&S priorities	4-1 Define M&S strategy	5-1 Required M&S competencies
1-2 Model-based systems engineering & collaborative engineering environments	2-2 Commercial SE standards	3-2 Best practices for model/sim development	4-2 M&S best practices: planning & employment	5-2 Commercial M&S lessons
1-3 M&S in testing	2-3 Distributed simulation standards	3-3 Distrib. LVC environments	4-3 Foster reuse	5-3 Body of Knowledge for Acqn M&S
1-4 M&S planning documentation	2-4 DoDAF utility	3-3(a) Standards	4-3(a) Business model	5-4 M&S education & training
1-5 RFP & contract language	2-4(a) DoDAF 2.0 Acq'n Overlay	3-3(b) Compliance	4-3(b) Responsibilities	5-4(a) DAU, DAG & on-line CLMs
1-6 Security certification	2-4(b) Standards for interchange	3-3(c) Event services	4-3(c) Discovery	5-4(b) Conferences, workshops & assist visits
	2-5 Metadata template for reusable resources	3-4 Central funding of broadly-needed M&S	4-4 Info availability	5-5 MSIAC utility
		3-4(a) Prioritized needs	4-4(a) Scenarios	
		3-4(b) Pilot projects	4-4(b) Systems	
		3-4(c) Expansion as warranted	4-4(c) Threats	
			4-4(d) Environments	
			4-5 VV&A	
			4-5(a) Documentation	
			4-5(b) Risk-basis	
			4-5(c) Examination	
			4-6 COTS SE tools	
			4-7 M&S metrics	

Acquisition Modeling and Simulation Master Plan, April 17, 2

A New M&S Management Approach



Modeling and Simulation Common and Cross-Cutting Business Plan (Draft)


Modeling and Simulation
Common and Cross-Cutting
Business Plan

DRAFT

Version 0.4.1

26 October 2006

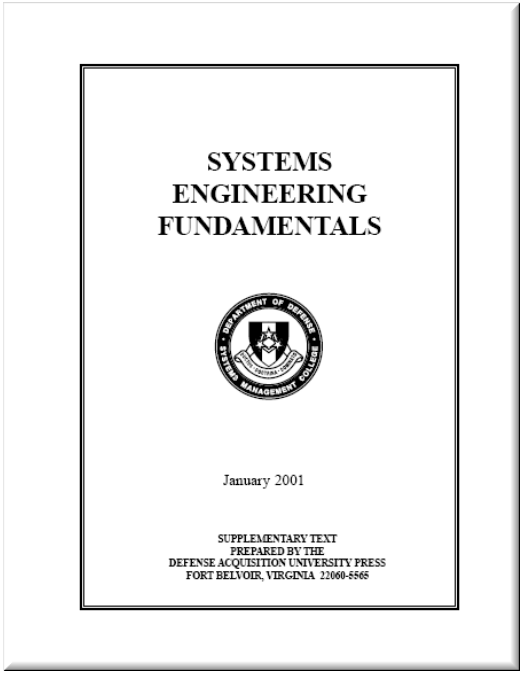
Prepared by
Modeling and Simulation Coordination Office

- **Modeling and Simulation Common and Cross-Cutting Business Plan, 26 Oct 2006**
- **Key points:**
  - Prepared by Modeling & Simulation Coordination Office (MSCO)
  - Serves as a guide to the implementation and promulgation of common and cross-cutting tools, data, services, and practices to support SECDEF priorities and enabling M&S initiatives to provide long term improvements in M&S:
    - Increase interoperability across M&S applications
    - Increase re-use of M&S and data used by M&S
    - Improve efficiency in development of M&S
    - Ensure emerging capabilities are used in M&S
    - Provide for an educated and informed workforce
  - Support a vision of ensuring the M&S is employed in the most effective and efficient manner possible to serve the needs of the DoD

Key Points from Policy Documents

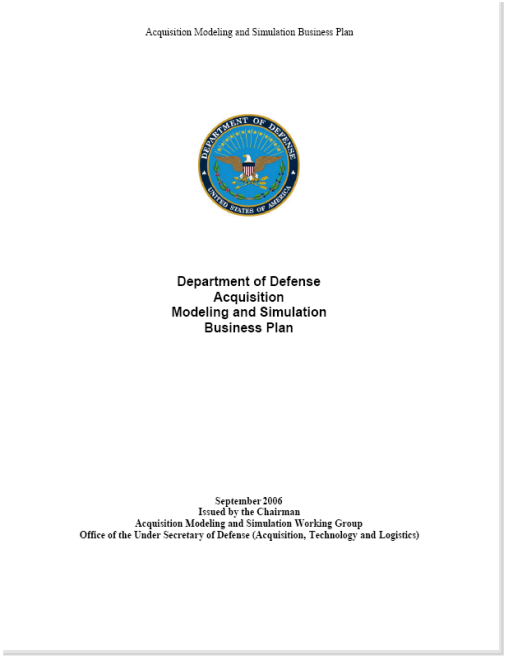
- Documents provide a comprehensive few good instructions/guidelines and advice but lack an overall system framework for implementation of well-constructed roles and responsibilities
- Guidance covers both short-term “tactical” interests as well as long-term “strategic” vision
- Challenge arises in the practical application of Program Manager responsibilities – balancing the traditional “cost-schedule-performance” equation
- Other than Chapter 13 of “System Engineering Fundamentals” and Para 5.4.7.9 of 5000.2 there seems to be very little cross talk between SE and M&S guidance
- Document trail is very stovepiped and provides little additional amplification or details as it descends
- Little practical advice for the PM in the lowest tiers and none above that
- M&S needs better integration into PM SOP guides

DoD Handbook of Systems Engineering Fundamentals



- **DoD Handbook of Systems Engineering Fundamentals, January, 2001**
- **Key points:**
  - Provides a basic, conceptual-level description of engineering management disciplines that relate to the development and life cycle management of a system
  - Describes the systems engineering process (SEP) as a comprehensive, iterative and recursive problem solving process that:
    - Transforms needs and requirements into a set of system product and process descriptions
    - Generates information for decision-makers
    - Provides input for further development
  - The system engineering process is the engine that drives the balanced development of system products and processes applied to each level of development, one level at a time.

DoD Acquisition M&S Business Plan


Acquisition Modeling and Simulation Business Plan

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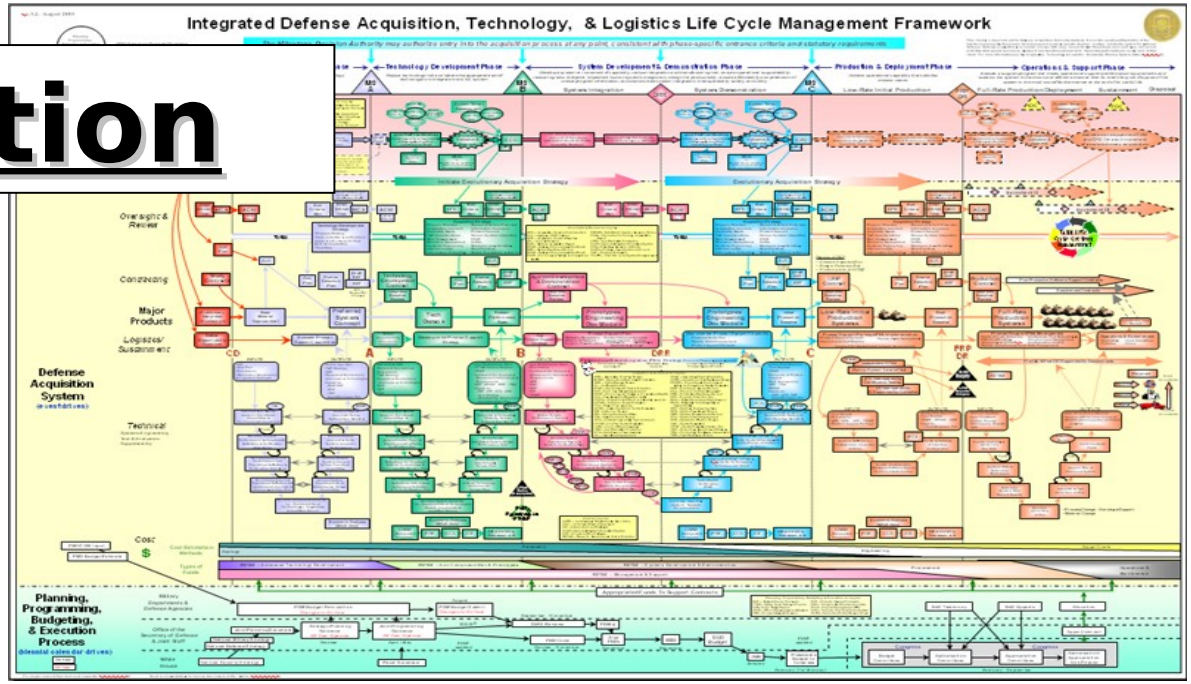
September 2006
Issued by the Chairman
Acquisition Modeling and Simulation Working Group
Office of the Under Secretary of Defense (Acquisition, Technology and Logistics)

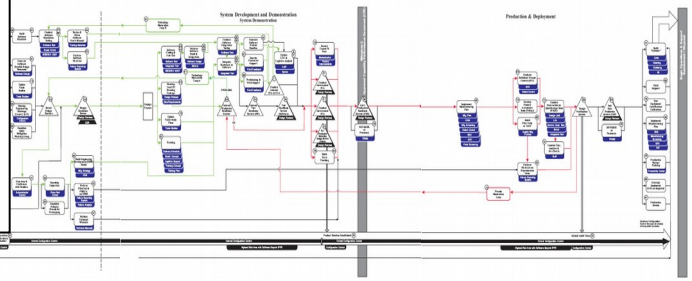
- Comes from a requirement of the SC for every group to have an M&S business plan
- Identifies M&S shortfalls that require correction or improvement

Baseline Acquisition/Sys Eng Model

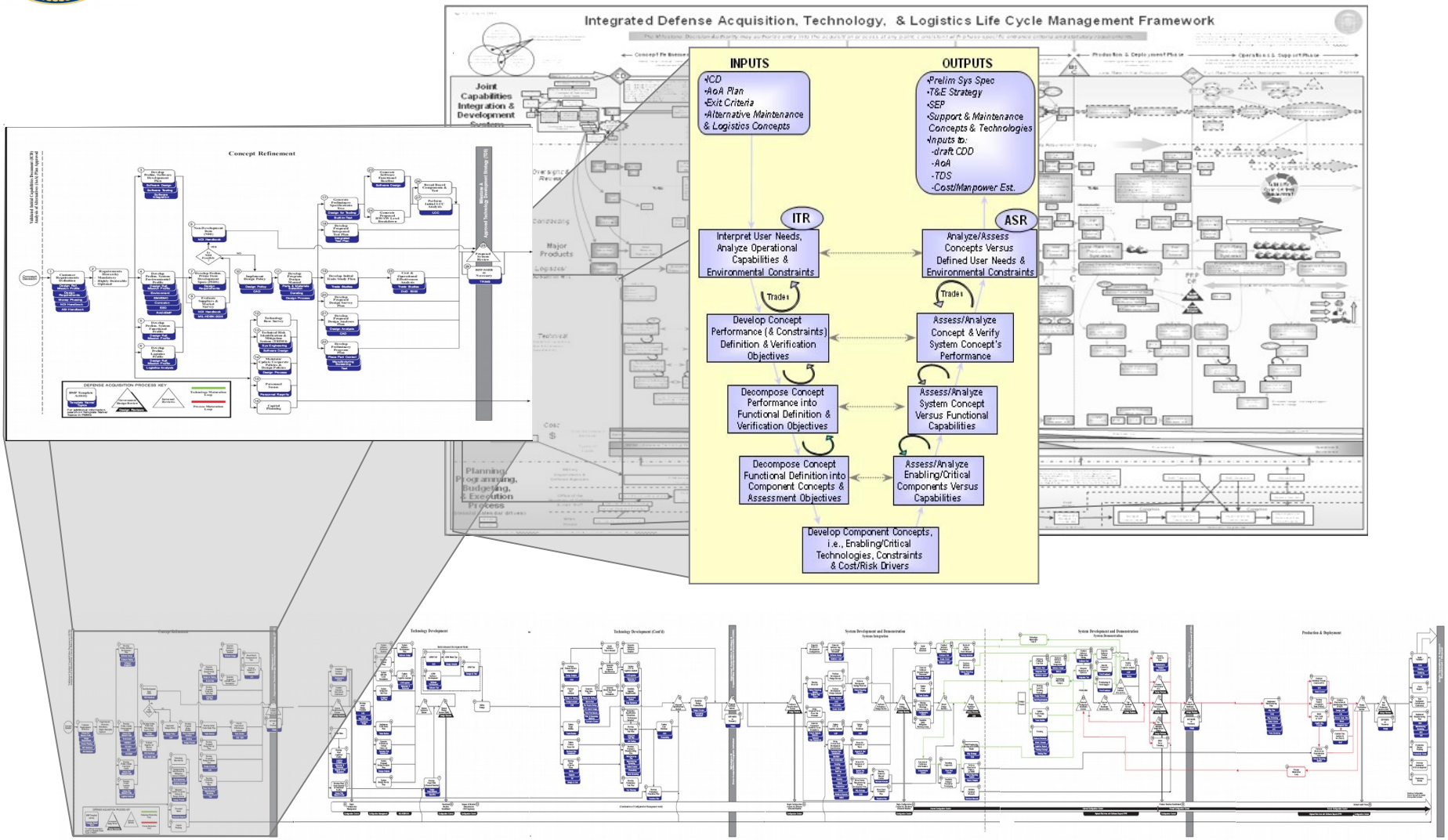
Acquisition


Integrated Defense Acquisition, Technology, & Logistics Life Cycle Management Framework
Defense Acquisition System
Planning, Programming, Budgeting, & Execution Process

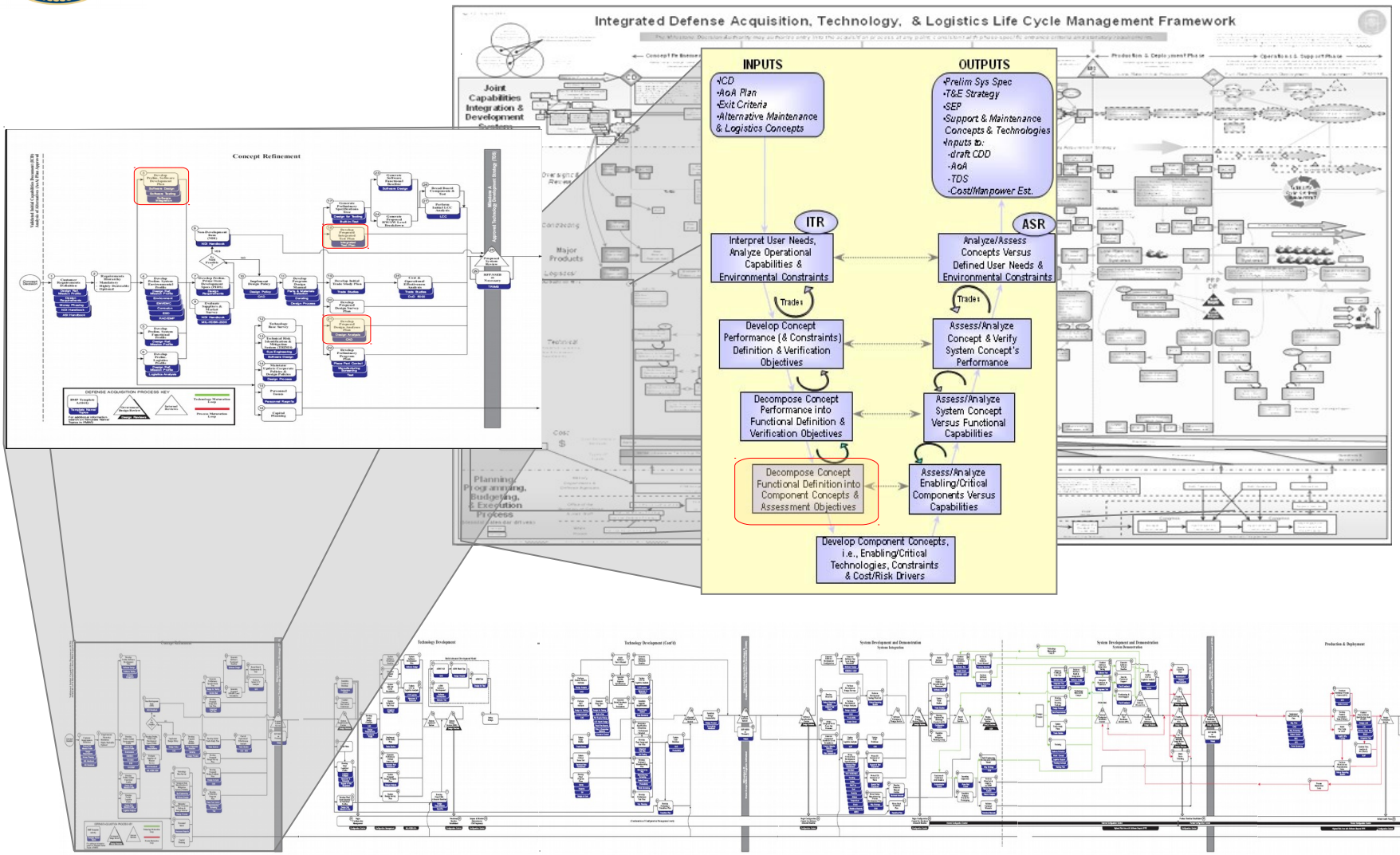
Systems Engineering



DoD Acquisition Model and BMPCOE SEM


Integrated Defense Acquisition, Technology, & Logistics Life Cycle Management Framework
Concept Refinement
INPUTS
•ICD
•AoA Plan
•Exit Criteria
•Alternative Maintenance & Logistics Concepts
OUTPUTS
•Prelim Sys Spec
•T&E Strategy
•SEP
•Support & Maintenance Concepts & Technologies
•Inputs to:
-draft CDD
-AoA
-TDS
-Cost/Manpower Est.
ITR
ASR
Interpret User Needs, Analyze Operational Capabilities & Environmental Constraints
Analyze/Assess Concepts Versus Defined User Needs & Environmental Constraints
Trades
Develop Concept Performance (& Constraints) Definition & Verification Objectives
Assess/Analyze Concept & Verify System Concept's Performance
Decompose Concept Performance into Functional Definition & Verification Objectives
Assess/Analyze System Concept Versus Functional Capabilities
Decompose Concept Functional Definition into Component Concepts & Assessment Objectives
Assess/Analyze Enabling/Critical Components Versus Capabilities
Develop Component Concepts, i.e., Enabling/Critical Technologies, Constraints & Cost/Risk Drivers

DoD Acquisition Model and BMPCOE SEM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Develop Component Concepts, i.e., Enabling/Critical Technologies, Constraints & Cost/Risk Drivers

Tying M&S into DOD through BMPCOE SEM

Concept Development

BMPCOE SEM mapping

M&S Application

Develop Component Concepts (& constraints) Definition and Verification Objectives

3 Develop Prelim. Software Development Plan
Software Design
Software Testing
Software Integration

M&S should be included early in the plan to establish the requirements for software simulations and Operating Environments to test the software being developed. Requirements and design software is also available.

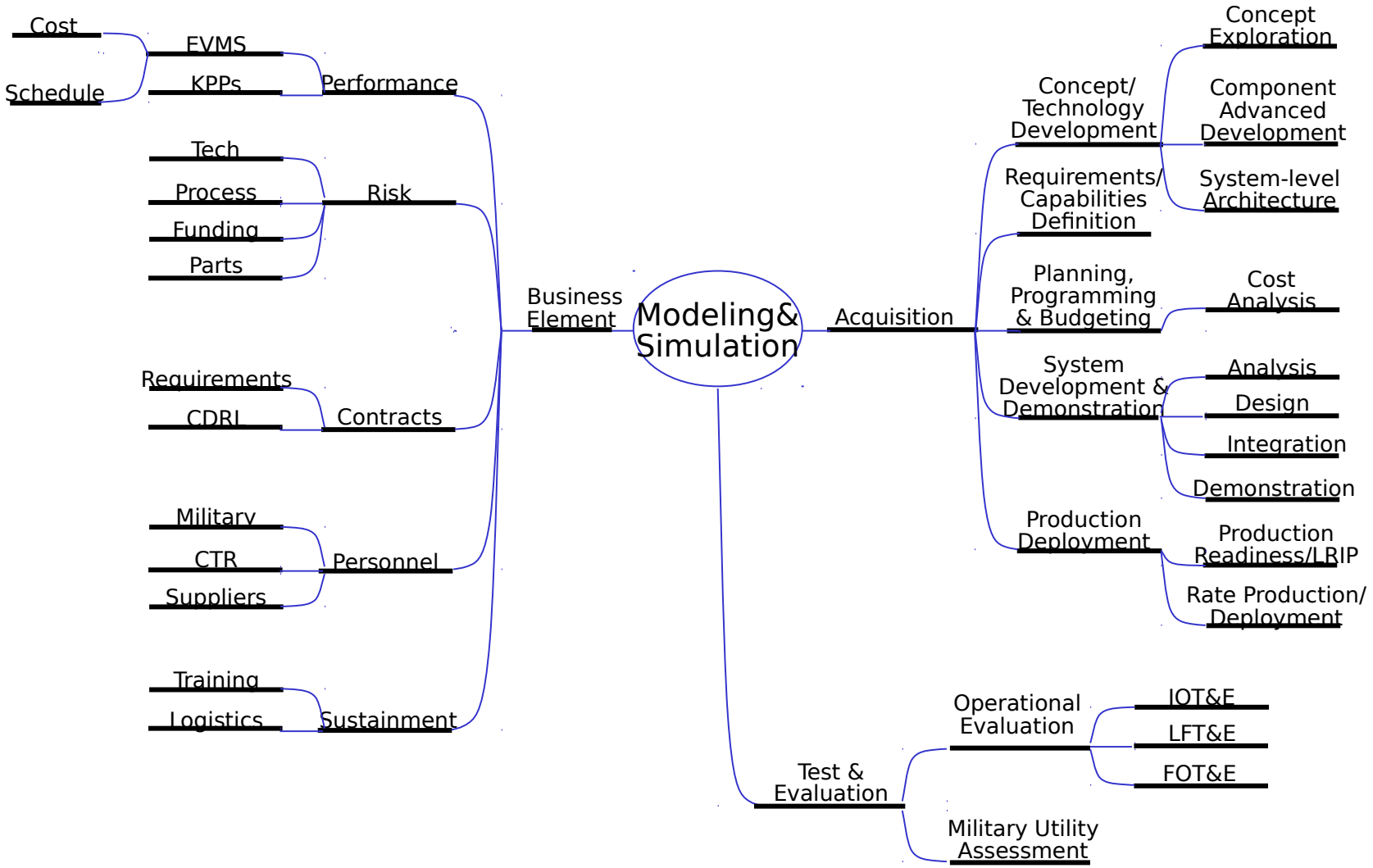
18 Develop Proposed Integrated Test Plan
Integrated Test Plan

M&S should be incorporated into the test plan instead of or before live testing. (e.g.. Shock testing, load testing, integration testing, etc.)

21 Develop Proposed Design analysis plan
Design Analysis
CAD

Sneak circuit, and CAD readily make themselves available for M&S applications in the plan. (Stress/Strength, Worst-Case Tolerance, Sneak Circuit, Failure Modes and Effects Analysis/Failure Modes, Effects, and Criticality Analysis (FMEA/FMECA), thermal, logistics, system safety, and ID/T)

Draft Roles-View M&S Taxonomy



Interview Strategy

- Interviewee base
  - PM, APM, ENG/T&E lead, M&S Lead
- Role of each as they see it
- Understanding of requirements
- Application of Req’ts
  - Plan
  - Implement
- Success Stories
  - Best M&S Applications
  - Where the Applications fit in the Taxonomy
  - How do the applications relate to the SEM insertion points
- Lessons learned
- Business model used

Prototype M&S Implementation/Integration Approach

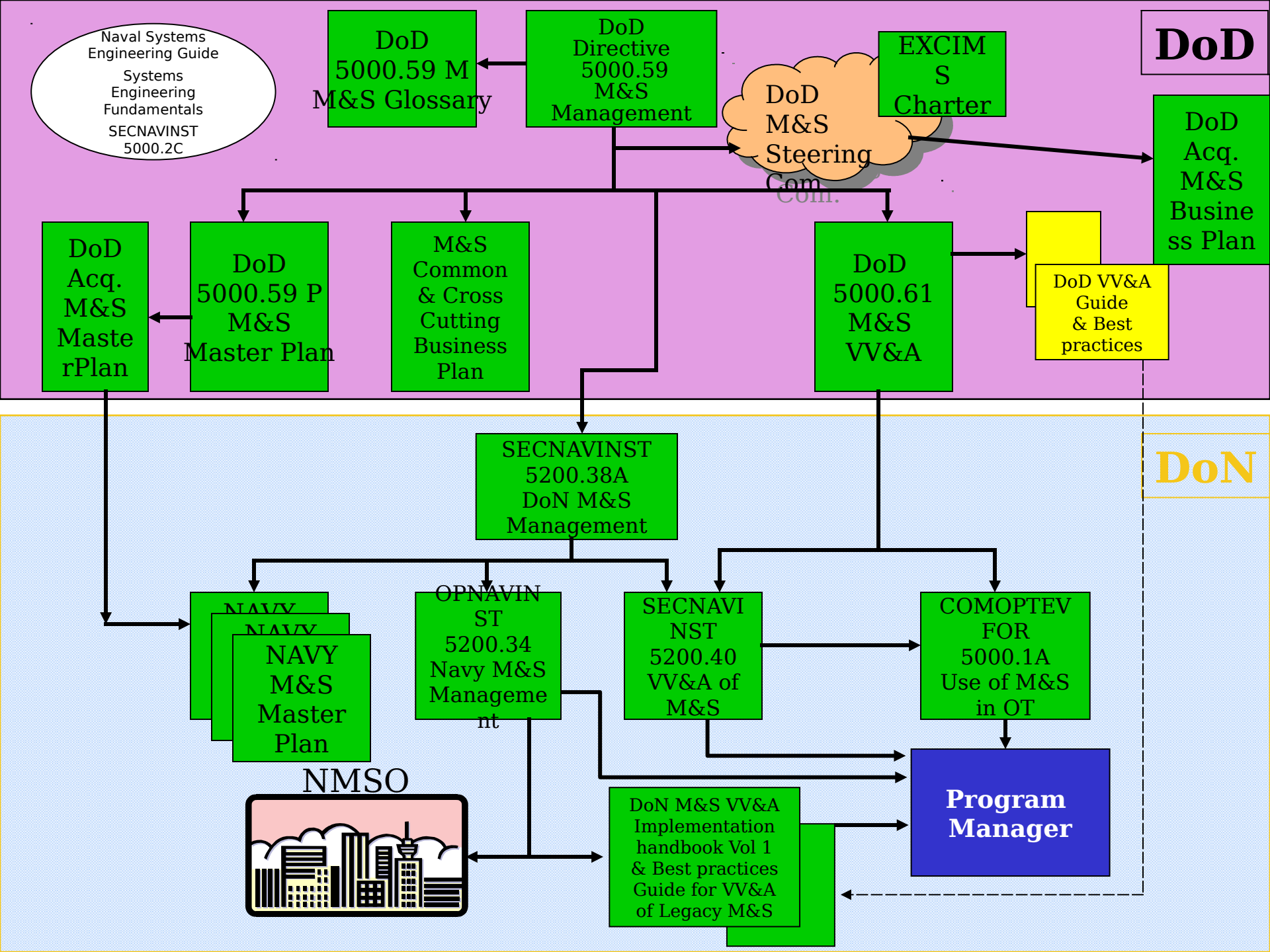
- Results of Study
  - Isolate significant findings
  - Identify implementation drivers
  - Success indicators
- Establish actionable guidelines based on results
  - How do I do it; what worked for others
  - Checklist with templates based on requirements
  - Actual scenarios; successes and failures
  - Metrics to gauge success as program progresses
  - Suggested approaches based on differing business models

Test Approach With Active Program Implementation

- Identify candidate program to ‘test’ the implementation approach
  - Medium/Small-scale program (shorter timelines)
  - Program includes both hardware & software elements
  - Involved prior to program start (able to be affected by method)
  - Standard acquisition (not a modification/follow-on)
  - Ideally, trial with several programs under different PEOs
- Provide advice and guidance when requested
- Document approaches and decisions
- Track program lifecycle risks/opportunities
- Short term actions
- Long term results

The Way Ahead

- DoD Document Revisions
  - Based on Surveys, Prototype guidelines, pilot project
- Training Approach
  - Defense Acquisition Workforce Improvement Act
  - Work with NPS


DoD
Naval Systems Engineering Guide
Systems Engineering Fundamentals
SECNAVINST 5000.2C
DoD 5000.59 M M&S Glossary
DoD Directive 5000.59 M&S Management
DoD M&S Steering Com.
EXCIMS Charter
DoD Acq. M&S Business Plan
DoD Acq. M&S MasterPlan
DoD 5000.59 P M&S Master Plan
M&S Common & Cross Cutting Business Plan
DoD 5000.61 M&S VV&A
DoD VV&A Guide & Best practices
DoN
SECNAVINST 5200.38A DoN M&S Management
NAVY M&S Master Plan
OPNAVINST 5200.34 Navy M&S Management
SECNAVINST 5200.40 VV&A of M&S
COMOPTEVFOR 5000.1A Use of M&S in OT
NMSO
DoN M&S VV&A Implementation handbook Vol 1 & Best practices Guide for VV&A of Legacy M&S
Program Manager

DoD Directive 5000.59M dtd 1/98
DoD Modeling and Simulation (M&S) Glossary

- Provides accepted terms and definitions for M&S

DoD Directive 5000.59P dtd 10/95
DoD Modeling and Simulation (M&S) Master Plan